



Agricultural
Research
Service

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Agricultural Land Use and Runoff in the Piedmont – a Long-term Look

Why Does it matter?

The effectiveness of various agricultural land uses for reducing runoff needs to be determined at landscape level to identify practices that protect land resources. Runoff-induced soil erosion is a serious and costly problem in the 41 million acre Piedmont region of southeastern USA. Few studies have recorded runoff from small agricultural watersheds over a sufficiently long period to allow such determination.

What was done?

Long-term rainfall-runoff records were compiled and analyzed from two small agricultural watersheds. In the first, 45 years of monthly rainfall-runoff records were processed from a 19.2 acre watershed (**W1**) which had gone through 4 different land use phases during this period: row-cropping (5-yr), kudzu (5-yr), grazed kudzu mixed with rescue grass (7-yr) and grazed bermudagrass (28-yr). In the second, 26.5 year of rainfall-runoff records were processed from a 6.7 acre watershed (**P1**) which was in row-crops under conventional tillage for 2.5-yr and has remained in row-cropping under conservation tillage with winter cover cropping since.

What was found?

W1: Runoff was 16.2% of total rainfall for crop, 9.9% for kudzu, 1.7% for kudzu/rescue, and 6.1% for bermuda phases. Equivalent seasonal breakdowns were:

summer 20.9, 0.4, 0.1, 3.3;

spring 18.0, 9.5, 3.2, 10.0;

winter 15.2, 15.1, 1.6, 7.5; and

fall 2.6, 11.4, 1.7, 2.1.

A 20-yr independent plot study nearby found that under continuous cotton 21% of the rainfall was lost to runoff and annual soil loss was 20 tons per acre.

P1: Runoff during 2.5 years of conventional tillage amounted to about 16.5% of annual rainfall. During the next 24 years under conservation tillage runoff was reduced to only about 2% of annual rainfall. Soil loss during the 2.5 yr of conventional tillage was about 10.4 tons per acre per year whereas it reduced by ~98% to 0.44 tons per acre per year during the 24 years of conservation tillage.



What is the impact?

Over six cubic miles of the most fertile and biologically active top one foot or so of the Piedmont soil has been lost due to erosion brought about by generations of row cropping under conventional tillage practices. A priority of current and future generations ought to be the reversal of this costly mistake and rehabilitation and regeneration of physical, chemical and biological properties of the soil for better resource protection and use. These long-term rainfall-runoff data and analysis demonstrate that the best way to protect farmlands in the Piedmont is to have vegetative cover all year around and to reduce or avoid surface soil disturbance.

Research Team and Contact information

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